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(71) Applicant: **MIRALFIN S.R.L.**
Via L. Seitz 47
I-31100 Treviso(IT)

(72) Inventor: **De' Longhi, Giuseppe**
Vicolo Rovero, 1
I-31100 Treviso(IT)

(74) Representative: **Rapisardi, Mariacristina,**
Brevetti S.r.l., Largo V Alpini 15
I-20145 Milano (IT)

(54) Oil radiator structure particularly for heating rooms.

(57) The oil radiator structure (1) particularly for heating rooms comprises a main body (2) which is defined by a plurality of mutually associated radiating elements (3), inside which a hot fluid circulates; each radiating element (3) comprises at least one shaped plate-like element which has heat propagation means suitable for reducing the heat on its outer surface and for simultaneously increasing the efficiency of the radiating element.

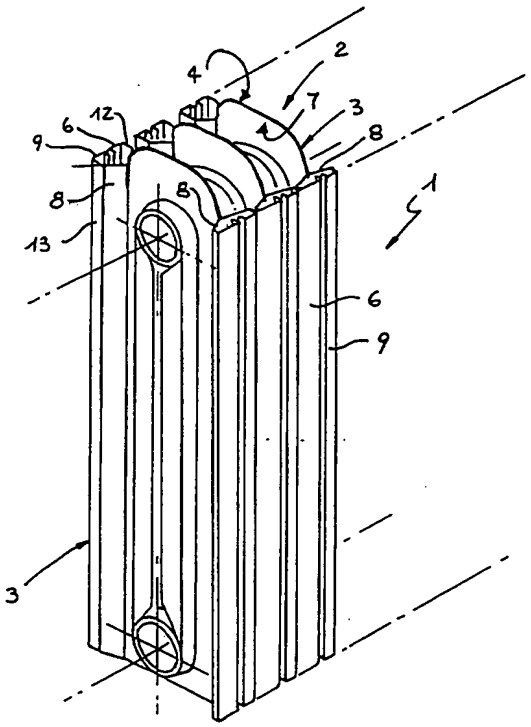

Fig. 1

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The present invention relates to an oil radiator structure particularly for heating rooms.

As is known, current radiators suitable for heating one or more rooms comprise a battery of mutually associated radiating elements inside which a hot fluid, for example a diathermic oil, is contained; said oil is heated by an electric resistor.

In this type of radiator, heat propagation occurs essentially in two ways: by conduction and by convection.

Heat propagation by conduction occurs between the internal surfaces of the oil radiator which are in contact with the hot fluid and the outer surfaces, which despite being spaced from the hot fluid, in a short time reach the same temperature as said fluid.

Heat transmission by convection occurs with the transfer of heat from the hot outer surface of the oil radiator to the air particles which surround it.

As the air particles receive heat, they move in a substantially vertical direction and are replaced by colder particles to be heated.

From what has been described above it can be seen that the surface temperature of known radiators is practically equal to the temperature of the hot fluid which circulates inside them.

Therefore, in this situation the surface temperature of an oil radiator can be so high that it might cause, in case of contact, burns on the skin of persons.

Therefore, according to the currently applicable statutory provisions on the subject, the surface temperature of an oil radiator must not be high and must prevent the possible contact of a person with said radiator from causing possible skin burns.

In order to lower the surface temperature of an oil radiator it is possible to keep the temperature of the fluid inside it within certain values, but the lowering of the temperature of the fluid of the oil radiator would entail, as can be easily understood, the simultaneous reduction of the heating power of the unit.

It should be furthermore noted that the particular bladelike configuration of the radiating elements of known radiators is highly dangerous, especially for children, in case of possible violent impacts against said elements.

The aim of the present invention is to eliminate the problems described above by providing an oil radiator structure particularly for heating rooms wherein the temperature of its outer surface is much lower than the temperature of the hot fluid contained therein, without thereby reducing its ability to heat the room in which it is installed.

Within the scope of this aim, an important object of the invention is to provide an oil radiator structure which is furthermore economical, since each radiating element which composes it is manufactured in only two parts which are welded and folded in line with automatic machines and thus in very short times and with modest costs.

Another object of the invention is to provide an oil radiator structure which has greater efficiency than known radiators.

A further object of the invention is to provide an oil radiator structure whose outer surface is substantially planar and thus extremely safe.

A further object of the invention is to provide an oil radiator structure wherein the radiating element is welded prior to the execution of the folds.

Not least object is to provide an oil radiator structure particularly for heating rooms which, for an equal temperature of the hot fluid of a conventional oil radiator, has a distinctly higher exchange of heat by convection than the latter.

This aim, these objects and others are achieved by an oil radiator structure particularly for heating rooms, which comprises a main body defined by a plurality of mutually associated radiating elements, inside which a hot fluid circulates, characterized in that each of said radiating elements comprises at least one first plate-like element, each lateral surfaces of said plate-like element having at least a first fold and a second fold for reducing the heat on the outer perimetric surface of said radiating element and for simultaneously increasing the efficiency thereof.

Further characteristics and advantages will become apparent from the detailed description of an oil radiator structure according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a partial perspective view of the oil radiator structure according to the invention;

Figure 2 is a front elevation view of a radiating element of the oil radiator according to the invention;

Figure 3 is a sectional view, taken along the plane III-III of Figure 2, according to the invention;

Figure 4 shows how the radiating element is welded before its lateral edges are folded according to the invention;

Figure 5 shows how, according to the known art, it is impossible to weld after folding the lateral edges of the radiating element;

Figures 6 to 10 show some of the steps of the folding of the edges of the radiating element once the welding operation has been performed thereon;

Figures 11 to 16 are views of the various types of fold which can be performed according to the invention; and

Figure 17 is a partially exploded perspective view of the oil radiator structure according to a different embodiment;

Figure 18 is a front elevation view of a radiating element of the oil radiator shown in Figure 17, according to the invention; and

Figure 19 is a sectional view, taken along the plane XIX-XIX of Figure 18, according to the invention.

With particular reference to the above figures, the oil radiator structure for heating rooms, generally designated by the reference numeral 1, comprises a main body, generally designated by 2, which is defined by a plurality of radiating elements, each designated by 3, in a first embodiment illustrated in Figure 2 and in a second embodiment illustrated in Figure 18.

Inside the radiating elements there is a hot fluid, and more specifically diathermic oil, which is heated by an electric resistor.

Each of the radiating elements 3 comprises at least one first plate-like element 4; each lateral surfaces of said plate-like element has at least a first fold and a second fold, respectively designated by the reference numerals 5 and 6, for reducing the heat on the outer perimetric surface of the radiating element and for simultaneously increasing the efficiency of said radiating element.

Each radiating element 3 furthermore comprises a second plate-like element 7 which has at least a portion, proximate to the first and second folds 5 and 6, which mates perfectly with the corresponding portion of the first plate-like element 4, so that it can be associated therewith, for example by welding.

The second plate-like element 7 also has at least a first fold 8 and a second fold 9 whose width and orientation are perfectly symmetrical with respect to those of the first and second folds 5 and 6 of the first plate-like element 4.

In particular, the first plate-like element 4 also comprises at least a third fold 10 which, for the second plate-like element 7, has been designated by the reference numeral 11.

For example, the radiating element 3, illustrated in Figure 2 and in a sectional view in Figure 3, also has a fourth fold 12 of the first plate-like element 4 and a fourth fold 13 of the second plate-like element 7.

In this case, the various folds of the first plate-like element 4, together with the various folds of the second plate-like element 7, define a channel-shaped compartment 15 which is capable of lowering the surface temperature of the oil radiator and in particular of the surfaces defined by the folds 6 and 9 of Figure 3, although the temperature of the fluid inside it is kept at high values and so as to assure a considerable ability to heat the room in which the oil radiator is installed.

By virtue of the type of fold shown in Figures 6 to 10, it is possible to obtain, by mutually associating a plurality of radiating elements 3, a lateral outer surface of the oil radiator, which is perfectly planar and thus able to assure maximum safety even in case of possible collisions with it.

Another important problem is solved by means of the present invention and therefore deserves mention.

In particular by observing figures 5 and 4, which respectively show the welding of the radiating element according to the known art and according to the present technical solution, the following can be noted.

A radiating element of an oil radiator is currently welded in line on automatic machines which are equipped with welding rollers, designated by 20, which during welding follow the path 21 which leads from a hub 22 to a hub 23 for connecting one radiating element to the next one.

During welding around the hubs 22 and 23, the welding rollers 20 must turn through a 180° curve and thus collide against the folded edges of each radiating element 3.

In other words, it is impossible to weld the first and second plate-like elements 4 and 7, if they have small transverse dimensions, after the lateral edges of the radiating elements 3 have been folded.

Therefore, in order to obviate this problem, welding has been performed prior to the folding of the lateral edges of each radiating element.

As can be seen in Figure 4, only the first folds 5 and 8 are performed respectively on the plate-like elements 4 and 7 in the direction opposite to the direction of the remaining folds.

At this stage each radiating element is welded, by means of the welding rollers 20, by passing the welding rollers around the hubs 22 and 23; in this case, said rollers are not hindered at all by the first folds 5 and 8.

Once the welding operation has been performed, as can be seen in Figures 6 to 10, all the folds required to obtain the radiating element according to the present invention are subsequently performed in different steps.

In practice it has been observed that the oil radiator structure according to the invention is particularly advantageous in that although a hot fluid flows inside it, it allows to have its outer surfaces at a considerably lower temperature which is well within the applicable statutory provisions on the subject but allows a higher oil radiator efficiency than the radiators of the known art.

Furthermore, by virtue of the particular folding of the plate-like elements of the oil radiator, the side walls of said oil radiator are substantially planar and free from discontinuities, thus also ensuring absolute safety in case of possible impacts against it.

In a different embodiment, illustrated in Figure 18, each plate-like element 4 has a plurality of openings 45, some of which have elements 46 for redirecting the air which circulates between the adjacent plate-like elements.

As can be seen in Figure 18, the openings 45 and the redirection elements 46 are accommodated mainly in a perimetric portion of the plate-like element and are advantageously produced at the same time as the radiating element, thus considerably reducing production costs and times.

More particularly, the plate-like element 4 comprises bridges, each of which is designated by 47, which are comprised between the openings 45; said bridges have dimensions suitable for limiting the transmission of heat by conduction from the radiating element 3 to the outer surface of the plate-like element. When several radiating elements are mutually associated so as to define the oil radiator, the openings 45, together with the redirection elements 46, define preferential air flow channels inside the oil radiator so as to heat by convection a considerable volume of said air which, also by virtue of the presence of holes 49 arranged in an upward region of each plate-like element, can exit therefrom.

Finally, it should also be mentioned that the body 2 of the oil radiator comprises two elements 43 for closing the end surfaces of said radiator and, in the case of the oil radiator shown in Figure 1, the body 2 can be covered by a grille, not shown in the drawings.

Said closure elements have any shape, for example a substantially hollow half-cylindrical one, and known connection means, for example of the snap-together type, for their rapid association with the body 2 of the oil radiator.

The operation of the oil radiator according to the invention is evident from what has already been described and illustrated.

In particular, as can be easily understood, the cold air is drawn from below the body of the oil radiator 2 and, by virtue of the presence of the channel-shaped compartments 15, can circulate inside each radiating element, flowing along a larger exchange surface than a conventional oil radiator and following the preferential channels which are defined, besides, for example in the constructive variation of Figure 18, both by the redirection elements 46 and by the openings 45, and exit from the holes 49 which are connected thereto.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and the state of the art.

Claims

1. Oil radiator structure particularly for heating rooms, which comprises a main body defined by a plurality of mutually associated radiating elements inside which a hot fluid circulates, characterized in that each of said radiating elements comprises at least one first plate-like element, each lateral surface of said plate-like element having at least a first fold and a second fold for reducing the heat on the outer perimetric surface of said radiating element and for simultaneously increasing the efficiency of said radiating element.

2. Structure according to claim 1, characterized in that said radiating element comprises a second plate-like element which has at least one portion, arranged proximate to said first and second folds, which matches perfectly, and is associated with, a corresponding portion of said first plate-like element.

3. Structure according to claim 1, characterized in that said second plate-like element comprises at least a first fold which is symmetrical to said first fold of said first plate-like element.

4. Structure according to claim 1, characterized in that said first plate-like element comprises at least a third fold.

5. Structure according to claim 2, characterized in that said second plate-like element is symmetrical to said first plate-like element.

6. Structure according to claims 1 and 3, characterized in that at least said first fold and said second fold of said first plate-like element and said at least first and second folds of said second plate-like element define a channel-shaped compartment.

7. Structure according to claim 1, characterized in that the lateral outer surface of said radiating element, when said radiating element is associated with other radiating elements, defines, in said main body, two larger substantially planar opposite side walls.

8. Structure according to claims 1 and 2, characterized in that said second plate-like element is welded to said first plate-like element before said folds are made in order to allow the execution of said welding in line on automatic machines equipped with welding rollers around the hubs which connect said radiating elements.

9. Structure according to claims 1 and 3, characterized in that at least initially, at least said first fold is performed, after said welding, in a direction which is opposite to the direction of the remaining said folds.

10. Oil radiator structure according to claim 1, characterized in that said at least one first plate-like element is perimetrically provided with a plurality of openings and redirection elements.

11. Oil radiator structure according to claim 1, characterized in that said plate-like element comprises bridges which are comprised between said openings and are suitable for limiting the transmission of heat by conduction from said radiating element to said outer surface.

12. Oil radiator structure according to claim 1, characterized in that said openings and said redirection elements define preferential channels for the flow of air which are suitable for heating said air by convection, said outer surface being furthermore provided with holes which are connected to said channels for the exit of said hot air from said plate-like element.

13. Oil radiator structure according to claim 1, characterized in that said body comprises two elements for closing its ends.

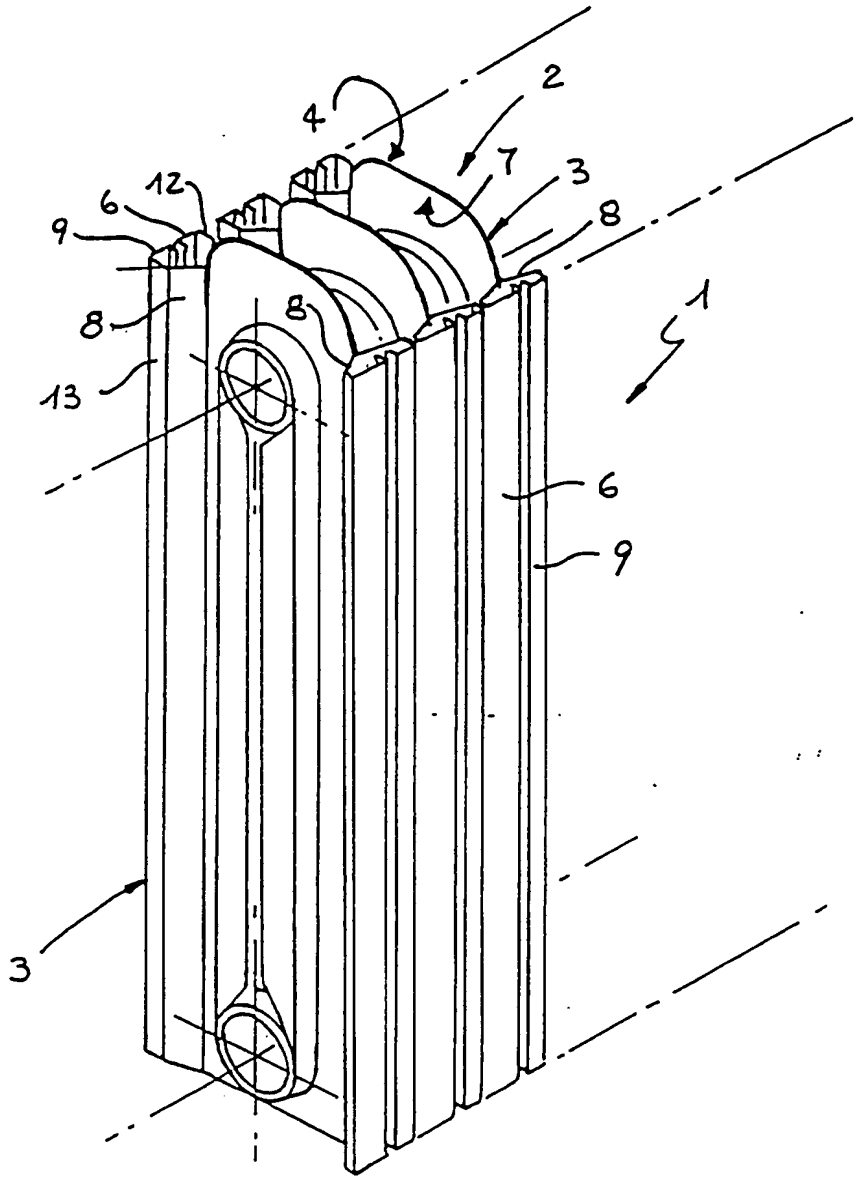


Fig. 1

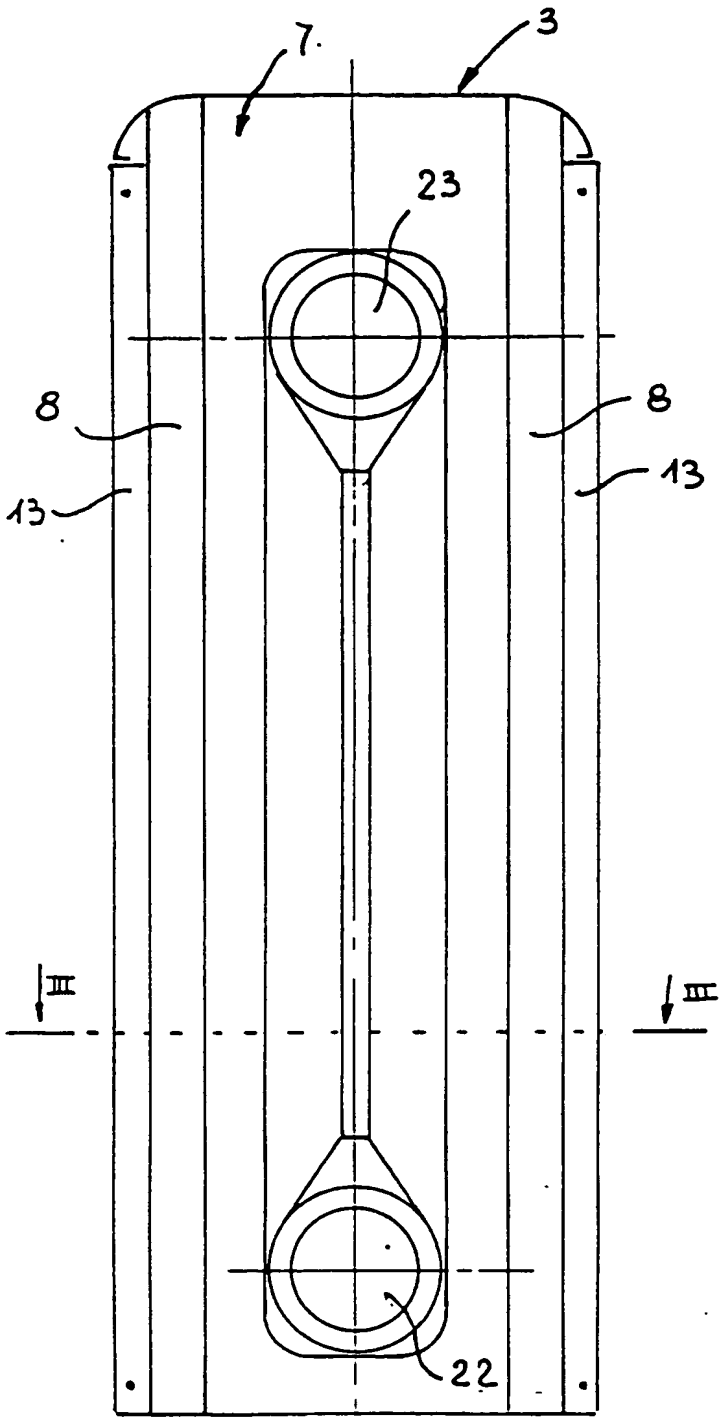


Fig. 2

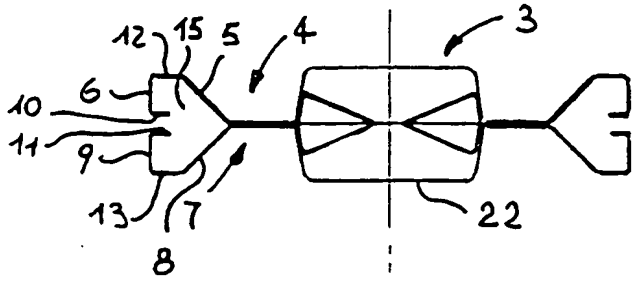


Fig. 3

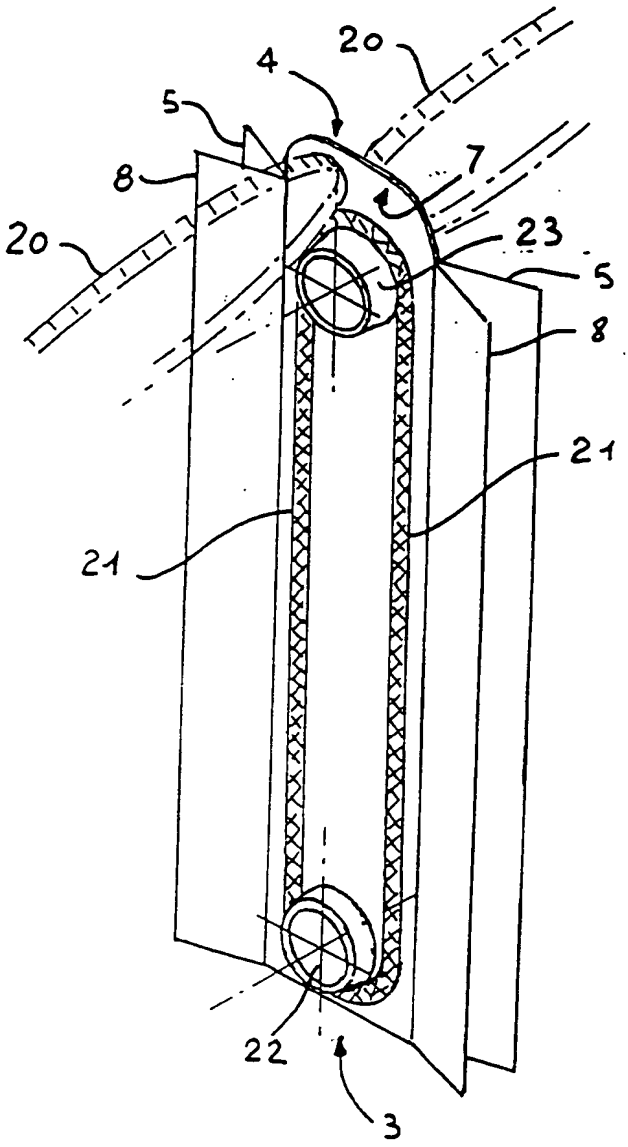


Fig. 4

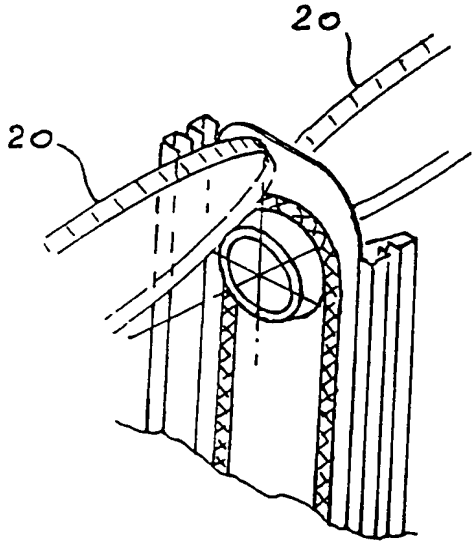


Fig. 5

(prior art)

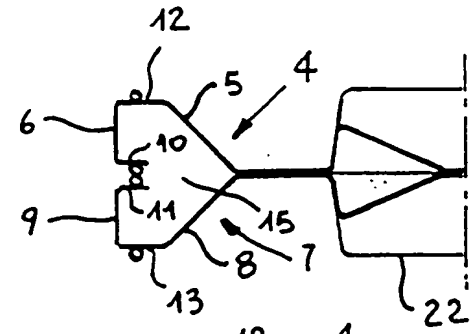


Fig.10

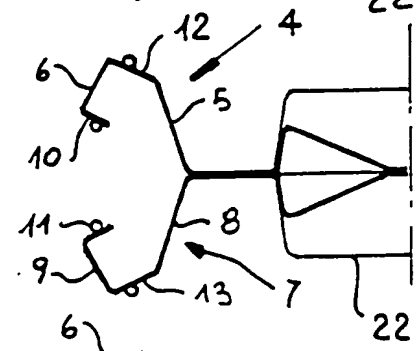


Fig 9

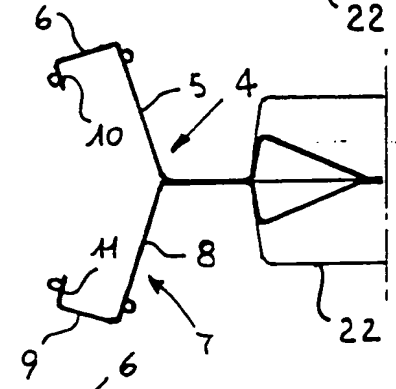


Fig. 8

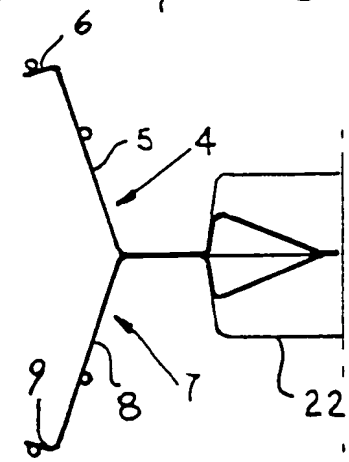


Fig. 7

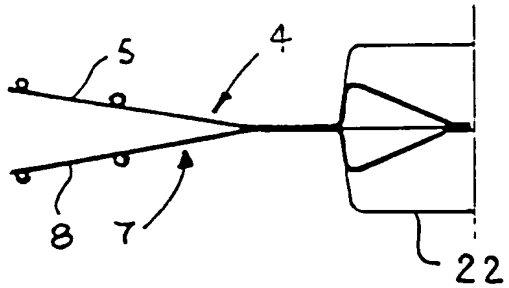


Fig. 6

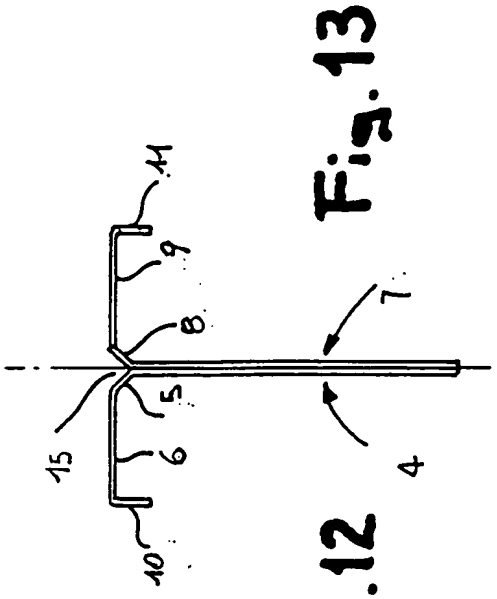


Fig.13

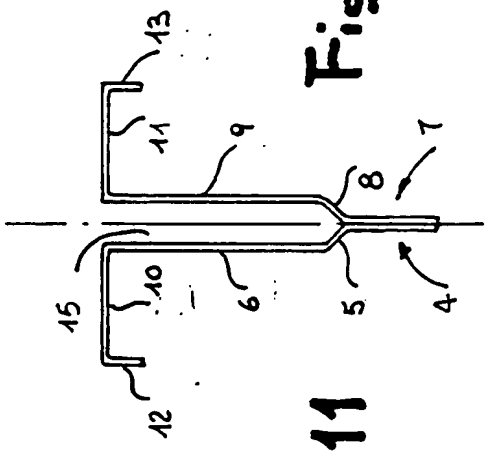


Fig.12

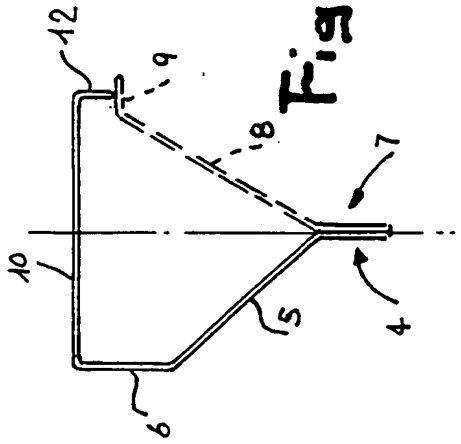


Fig.11

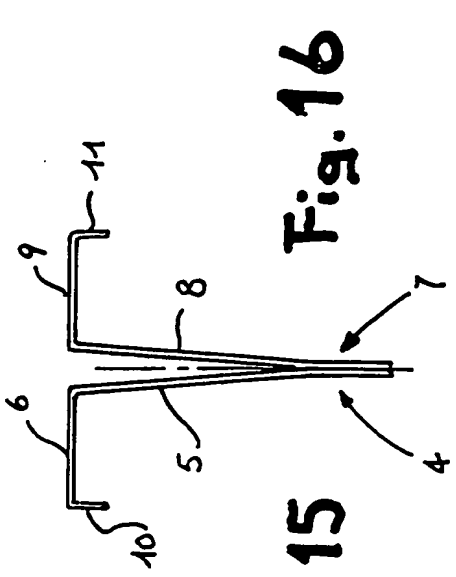


Fig.16

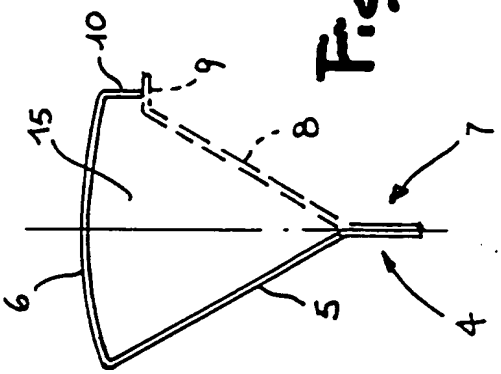


Fig.15

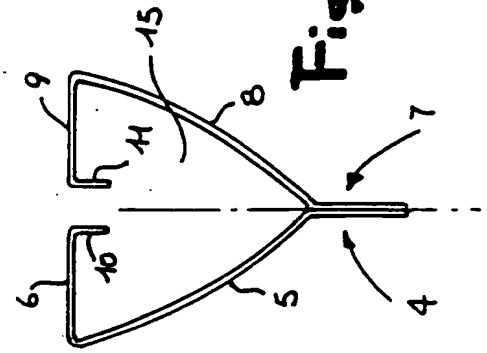


Fig.14

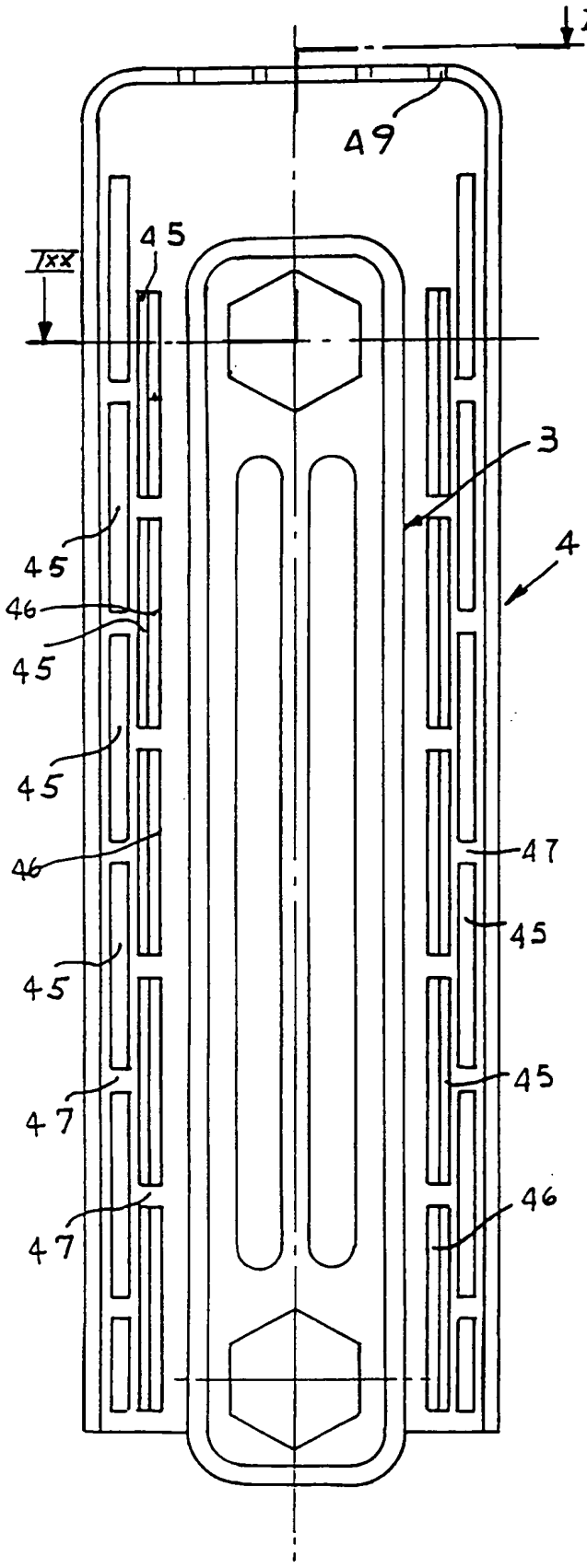
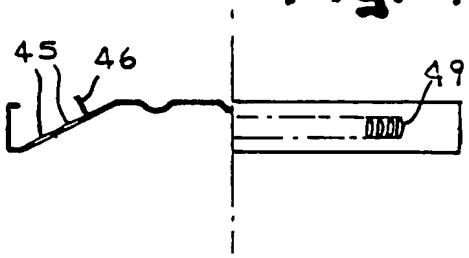


Fig. 18

Fig. 19



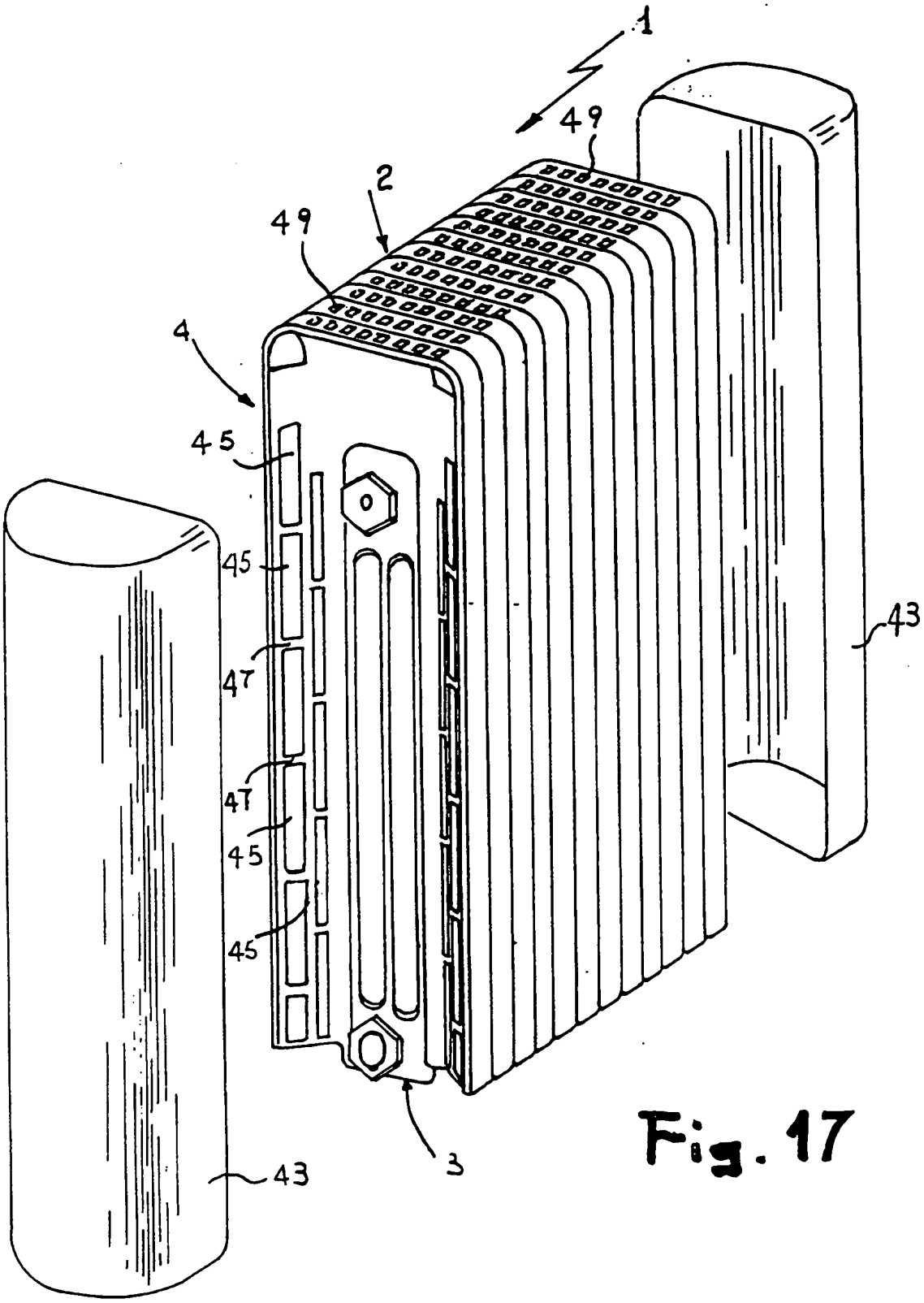


Fig. 17

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EUROPEAN SEARCH REPORT

Application Number
EP 92 10 7741

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	EP-A-0 292 441 (DE'LONGHI S.P.A.) * the whole document *	1,2,3,4,5,6,7	F28F1/14 F24H3/00
Y	DE-A-2 703 632 (SCHIEDEL KG) * the whole document *	1,2,3,4,5,6,7	
A	US-A-4 071 934 (ZOLMAN ET AL.) * the whole document *	1,10,11	
A	FR-A-2 235 343 (APPLIMO) * the whole document *	1	
A	FR-A-2 137 058 (GRUND AEBI S.N.C. DEI GEOMETRA CAPORALE FRANCO E D'ANTONIO LUCIO) * the whole document *	1	
A	DE-A-1 957 221 (SOC. F.A.C.I.S. METALLURGICA) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F28F
F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 MAY 1993	SMETS E.D.C.

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